CAUVERY COLLEGE FOR WOMEN (AUTONOMOUS)

(Nationally Re-accredited (III cycle) with 'A' (CGPA 3.41 out of 4)

Grade by NAAC

PG AND RESEARCH DEPARTMENT OF MATHEMATICS

B.Sc MATHEMATICS SYLLABUS

2021-2022 ONWARDS

CAUVERY COLLEGE FOR WOMEN (AUTONOMOUS)

PG AND RESEARCH DEPARTMENT OF MATHEMATICS

B.Sc MATHEMATICS

PROGRAMME OUTCOMES

PO1	Demonstrate basic manipulative skills in algebra, geometry and trigonometry.
PO2	Communicate mathematical principles and ideas with clarity and coherence, both written and verbally, demonstrating communication skills to be used in any future career.
PO3	Demonstrate proficiency in linear algebra, real and complex analysis as well as areas of modern, proof-based Mathematics.
PO4	Compute limits and derivatives using their definitions, and use the fundamental theorem of calculus to compute definite and indefinite integrals.
PO5	Construct counter examples to mathematical statements and understand the importance of hypotheses into a viable career path.

CAUVERY COLLEGE FOR WOMEN(AUTONOMOUS)
PG AND RESEARCH DEPARTMENT OF MATHEMATICS
B.Sc MATHEMATICS COURSE STRUCTURE
(For the candidates admitted in the year 2021-2022)

Sem	Part	Course	Course Title	Course Code	Ins. Hrs	Credit	Exam Hours	Marks Int	Marks Ext	Total
I	I	Language Course – I (LC) – Tamil*/Other Languages +#	இக்கால இலக்கியம் / Story, Novel, History of Hindi Literature-I &Grammar – 1 / History of Popular Tales Literature and Sanskrit Story / Communication in French –I	19ULT1/ 19ULH1/ 19ULS1/ 19ULF1	6	3	3	25	75	100
	II	English Language Course - I (ELC)	Functional Grammar for Effective Communication –I	19UE1	6	3	3	25	75	100
	III	Core Course – I (CC)	Differential Calculus and Trigonometry	19UMA1CC1	5	5	3	25	75	100
		Core Course – II (CC)	Integral Calculus and Fourier Series	19UMA1CC2	6	6	3	25	75	100
		First Allied Course – I (AC)	Mathematical Statistics – I	19UMA1AC1	5	3	3	25	75	100
	IV	UGC Jeevan Kaushal Life skills	Universal Human Values	20UGVE	2	2	3	25	75	100
				TOTAL	**30**	**22**	**-**	**-**	**-**	**600**

Sem	Part	Course	Course Title	Course Code	Ins. Hrs	Credit	Exam Hours	Marks		Total
								Int	Ext	
II	I	Language Course – II (LC) - Tamil*/Other Languages +#	இடைக்கால இலக்கியமும், புதினமும்	19ULT2/ 19ULH2/ 19ULS2/ 19ULF2	6	3	3	25	75	100
			Prose, Drama, History of Hindi Literature –II & Grammar - 2							
			Poetry, Textual Grammar and Alakara							
			Communication in French –II							
	II	English Language Course – II(ELC)	Functional Grammar for Effective Communication –II	19UE2	6	3	3	25	75	100
	III	Core Course – III (CC)	Analytical Geometry and Vector Calculus	20UMA2CC3	6	6	3	25	75	100
		First Allied Course – II (AP)	Mathematical Statistics- II (Practical)	19UMA2AC1P	5	3	3	40	60	100
		First Allied Course – III (AC)	Mathematical Statistics-III	19UMA2AC2	5	3	3	25	75	100
	IV	Environmental Studies	Environmental Studies	21UGES	2	2	3	25	75	100
	V	**Extra Credit Course**	**Swayam Online Course**	**To be fixed Later**	**As Per UGC Recommendations**					
				TOTAL	**30**	**20**	**-**	**-**	**-**	**600**

Sem	Part	Course	Course Title	Course Code	Ins. Hrs	Credit	Exam Hours	Marks Int	Marks Ext	Total
III	I	Language Course – III (LC) – Tamil*/Other Languages +#	காப்பியமும், நாடகமும்	19ULT3/ 19ULH3/ 19ULS3/ 19ULF3	6	3	3	25	75	100
			Medieval, Modern Poem, Poetics & History of Hindi Literature – 3							
			Prose, Textual Grammar and Vakyarachana							
			Communication in French –III							
	II	English Language Course - III(ELC)	Reading and Writing For Effective Communication- I	19UE3	6	3	3	25	75	100
	III	Core Course – IV CC)	Differential Equations and Laplace Transforms	19UMA3CC4	5	5	3	25	75	100
		Core Course – V (CC)	Classical Algebra and Theory of Equations	19UMA3CC5	5	5	3	25	75	100
		Second Allied Course – I (AC)	Python Programming	21UMA3AC3	4	4	3	25	75	100
		Second Allied Course – II (AP)	Python Programming LAB	21UMA3AC2P	2	2	3	40	60	100
	IV	Non Major Elective I – for those who studied Tamil under Part I a) Basic Tamil for other language students b) Special Tamil for those who studied Tamil up to 10th, +2 but opt for other languages in degree programme	Mathematics for competitive Examinations-I	19UMA3NME1	2	2	3	25	75	100
			Basic Tamil	19ULC3BT1						
			Special Tamil	19ULC3ST1						
	V	**Extra Credit Course**	**Swayam Online Course**	**To be fixed Later**	**As Per UGC Recommendations**					
			TOTAL		**30**	**24**	**-**	**-**	**-**	**700**

Sem	Part	Course	Course Title	Course Code	Ins. Hrs	Credit	Exam Hours	Marks		Total
								Int	Ext	
IV	I	Language Course – IV(LC) - Tamil*/Other Languages +#	பண்டைய இலக்கியம் Letter Writing, Precise Writing, General Essays, Technical Terms, Proverbs, Amplifications, Idioms & Phrases, History of Hindi Literature – 4 Drama, History of Drama Literature Communication in French –IV	19ULT4/ 19ULH4/ 19ULS4/ 19ULF4	6	3	3	25	75	100
	II	English Language Course – IV(ELC)	Reading and Writing For Effective Communication- II	19UE4	6	3	3	25	75	100
	III	Core Course – VI (CC)	Sequences and Series	21UMA4CC6	6	5	3	25	75	100
		Core Course – VII (CC)	Methods in Numerical Analysis	21UMA4CC7	4	3	3	25	75	100
		Second Allied Course – III (AC)	Internet of Things	21UMA4AC4	4	3	3	25	75	100
	IV	Skill Based Elective-I (SBE)	Introduction to R	21UMA4SBE1A	2	2	3	25	75	100
			Introduction to Statistical Tools and Techniques – SPSS	21UMA4SBE1B						
		Non Major Elective II – for those who studied Tamil under Part I a) Basic Tamil for other language students b) Special Tamil for those who studied Tamil up to10th, +2 but opt for other languages in degree programme	Mathematics for competitive Examinations-II	19UMA4NME2	2	2	3	25	75	100
			Basic Tamil	19ULC4BT2						
			Special Tamil	19ULC4ST2						
	V	**Extra Credit Course**	**Swayam Online Course**	**To be fixed Later**	**As Per UGC Recommendations**					
			TOTAL		**30**	**21**	**-**	**-**	**-**	**700**

15 Days INTERNSHIP during Semester Holidays

Sem	Part	Course	Course Title	Course Code	Ins. Hrs	Credit	Exam Hours	Marks		Total
								Int	Ext.	
V	III	Core Course – VIII (CC)	Abstract Algebra	21UMA5CC8	6	5	3	25	75	100
		Core Course – IX (CC)	Real Analysis	21UMA5CC9	5	5	3	25	75	100
		Core Course – X (CC)	Statics	21UMA5CC10	5	4	3	25	75	100
		Core Course – XI (CC)	Discrete Mathematics	21UMA5CC11	4	3	3	25	75	100
		Major Based Elective- I	Fuzzy Set Theory and its Applications	21UMA5MBE1A	4	3	3	25	75	100
			Astronomy	21UMA5MBE1B						
			Artificial Intelligence	21UMA5MBE1C						
	IV	Skill Based Elective-II	Statistical Tools and Techniques – R Programming (Practical)	19UMA5SBE2AP	2	2	3	40	60	100
			Statistical Tools and Techniques – SPSS (Practical)	19UMA5SBE2BP						
		Skill Based Elective -III	LaTeX (Practical)	21UMA5SBE3AP	2	2	3	40	60	100
			Numerical methods with MATLAB Programming (Practical)	21UMA5SBE3BP						
		UGC Jeevan Kaushal Life Skills	**Professional Skills**	**19UGPS**	**2**	**2**	**3**	**25**	**75**	**100**
	V	**Extra credit course**	**Swayam Online Course**	**To be fixed Later**	**As per UGC Recommendations**					
			Internship	**To be fixed Later**	**-**					
	TOTAL				**30**	**26**	**-**	**-**	**-**	**800**

Sem	Part	Course	Course Title	Course Code	Ins. Hrs	Credit	Exam Hours	Marks		Total
								Int	Ext.	
VI	III	Core Course – XII (CC)	Linear Algebra	21UMA6CC12	5	5	3	25	75	100
		Core Course – XIII (CC)	Complex Analysis	21UMA6CC13	6	5	3	25	75	100
		Core Course – XIV (CC)	Dynamics	21UMA6CC14	5	5	3	25	75	100
		Core Course – XV (CC)	Operations Research	21UMA6CC15	5	4	3	25	75	100
		Major Based Elective-II	Graph Theory	21UMA6MBE2A	4	3	3	25	75	100
			Mathematical Modelling	21UMA6MBE2B						
			Fundamentals of Big Data Analytics	21UMA6MBE2C						
		Major Based Elective-III	Probability and Queuing Theory	21UMA6MBE3A	4	3	3	25	75	100
			Number Theory	21UMA6MBE3B						
			Web Technology	21UMA6MBE3C						
	V	Gender Studies	Gender Studies	19UGGS	1	1	3	25	75	100
		Extension Activities	Extension Activities	19UGEA	-	1	-	-	-	-
	TOTAL				**30**	**27**	**-**	**-**	**-**	**700**
	GRAND TOTAL				**180**	**140**	**-**	**-**	**-**	**4100**

List of Allied Courses

Group I (Any one)	**Group II (Any one)**
1. Physics	1. Chemistry
2. Mathematical Statistics	2. Computer Science
3. Financial Accounting	3. Management Accounting

Language Part – I	-	4	
English Part –II	-	4	
Core Paper	-	15	
Allied Paper	-	4	
Allied Practical	-	2	
Non-Major Elective	-	2	
Skill Based Elective	-	3	
Major Based Elective	-	3	
Environmental Studies	-	1	
Universal Human Values	-	1	
Professional Skills	-	1	
Gender Studies	-	1	
Extension Activities	-	1	(Credit only)

➢For those who studied Tamil up to 10^{th}, +2 (Regular Stream)

\+ Syllabus for other Languages should be on par with Tamil at degree level

those who studied Tamil up to 10^{th},+2 but opt for other languages in degree level under Part I should study special Tamil in Part IV

** Extension Activities shall be outside instruction hours

Non Major Elective I & II – for those who studied Tamil under Part I

a) Basic Tamil I & II for other language students
b) Special Tamil I & II for those who studied Tamil up to 10^{th} or +2 but opt for other languages in degree programme

Note:

	Internal Marks	**External Marks**
1. Theory	25	75
2. Practical	40	60

3. Separate passing minimum is prescribed for Internal and External marks

FOR THEORY

The passing minimum for CIA shall be 40% out of 25 marks [i.e. 10 marks]

The passing minimum for University Examinations shall be 40% out of 75 marks [i.e. 30 marks]

FOR PRACTICAL

The passing minimum for CIA shall be 40% out of 40 marks [i.e. 16 marks]

The passing minimum for University Examinations shall be 40% out of 60 marks [i.e. 24 marks]

SEMESTER I

DIFFERENTIAL CALCULUS AND TRIGONOMETRY

2019-2020 Onwards

Semester – I	DIFFERENTIAL CALCULUS AND TRIGONOMETRY	Hours/Week – 5	
CORE COURSE-I		Credits – 5	
Course Code – 19UMA1CC1		Internal 25	External 75

Objectives:

- To inculcate the basics of differentiation and their applications.
- To introduce the notion of curvature, Evolutes and Involutes in polar co-ordinates.
- To understand the basic concepts of Trigonometry.

Course Outcome:

On the Successful completion of the course the student would be able to

CO Number	CO Statement	Knowledge Level
CO1	Explain the basic concepts of differentiation, extreme functions of two variables.	K3
CO2	Apply the concept of differentiation for explaining curvature.	K3
CO3	Distinguish the trigonometric functions, related problems.	K3
CO4	Associate various types of hyperbolic and inverse hyperbolic functions and Solve problems in summation of trigonometric series.	K4
CO5	Examine the conceptual understanding and fluency with trigonometric functions, techniques and manipulations necessary for success in calculus.	K4

Mapping with Programme Outcomes:

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	S	S
CO2	M	S	S	M	S
CO3	S	S	M	M	S
CO4	S	S	M	M	S
CO5	M	M	S	S	M

S-Strong, M-Medium, L-Low

CORE COURSE-I (CC)

DIFFERENTIAL CALCULUS AND TRIGONOMETRY

SYLLABUS

UNIT I

Successive Differentiation: The n^{th} derivative – Standard results – Trigonometrical transformation – Formation of equations involving derivatives – Leibnitz formula for the n^{th} derivative of a product – A complete formal proof by induction.

Meaning of the Derivative: Geometrical interpretation – Meaning of the sign of the differential coefficient. Maxima and Minima of functions of two variables.

UNIT II

Curvature – Circle, radius and centre of curvature – Cartesian formula for the radius of curvature – The coordinates of the centre of curvature – Evolute and Involute - Radius of curvature when the curve is given in polar coordinates.

UNIT III

Expansions of cos nθ and sin nθ – Expansion of tan nθ in powers of tan θ – Expansion of tan(A + B + C + …) (omitting examples on formation of equations) - Powers of sines and cosines of θ in terms of functions of multiples of θ – Expansion of $\sin^n \theta$ and $\cos^n \theta$ when n is a positive integer– Expansions of sin θ and cos θ in a series of ascending powers of θ.

UNIT IV

Hyperbolic functions – Relation between hyperbolic functions – Inverse hyperbolic functions.

UNIT V

Logarithms of complex quantities - To find the logarithm of x + iy – General value of logarithm of x + iy – Summation of Trigonometrical Series – Method of differences – Some of series of n angles in arithmetic progression – Sum of cosines of n angles in arithmetic progression – Gregory's series.

TEXT BOOKS:

S.No	Authors Name	Title of the Book	Publishers Name	Year of Publication
1.	S. Narayanan, T. K.Manicavachagom Pillay	Calculus, Volume I	S. Viswanathan (Printer & publishers), Pvt Ltd	2015
2.	S. Narayanan, T. K.Manicavachagom Pillay	Trigonometry	S. Viswanathan (Printer & publishers), Pvt Ltd	2013

CHAPTERS AND SECTIONS:

UNIT	CHAPTER	SECTIONS
I	3 4 8	1.1 – 1.6 [1] 2.1 & 2.2 [1] 4 & 4.1[1]
II	10	2.1 - 2.6 [1]
III	3	1, 2, 3, 4, 4.1, 5 & 5.1 [2]
IV	4	1, 2, 2.1 - 2.3 [2]
V	5 6	5, 5.1, 5.2 [2] 1, 2, 3.1 [2]

REFERENCE BOOKS:

S.No	Authors Name	Title of the book	Publishers Name	Year of Publication
1.	S. Arumugam and Issac	Calculus, Volume I	New Gamma Publishing House	1991
2.	S. Narayanan, T.K. Manichavasagam Pillai	Trigonometry	S. Viswanathan Pvt Limited and Vijay Nicole Imprints Pvt Limited	2004
3.	A.Singaravelu and R.Rama	Differential Calculus and Trigonometry	R publications, Nagapattinam	2003

Pedagogy:

Power point presentation, Group Discussion, Seminar, Quiz, Assignment.

CORE COURSE-II (CC)

INTEGRAL CALCULUS AND FOURIER SERIES

2019-2020 Onwards

Semester - I		**Hours/Week – 6**	
CORE COURSE-II	**INTEGRAL CALCULUS AND FOURIER SERIES**	**Credits – 5**	
Course Code – 19UMA1CC2		**Internal**	**External**
		25	**75**

Objectives:

- To inculcate the basics of Integration and their applications.
- To introduce the order of Integration, Triple Integrals, Beta and Gamma functions.
- To understand the basic concepts of Fourier series.

Course Outcomes:

On the successful completion of the course, students will be able to

CO Number	**CO Statement**	**Knowledge Level**
CO1	Apply the concepts of double, triple integrals.	**K3**
CO2	Distinguish the concepts of Beta and Gamma functions.	**K3**
CO3	Apply the concepts of half range Fourier series for solving problems necessary for success in calculus.	**K3**
CO4	Associate various types of Fourier series for solving problems.	**K4**
CO5	Evaluate the types of integration**.**	**K5**

Mapping with Programme Outcomes:

COs/POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	S	M	S	S	S
CO2	M	S	S	S	S
CO3	S	S	M	M	S
CO4	S	S	M	M	S
CO5	S	M	S	S	M

S - Strong, M - Medium, L - Low

CORE COURSE-II (CC)

INTEGRAL CALCULUS AND FOURIER SERIES

SYLLABUS

UNIT I

Integration: Integration of rational algebraic functions $\int \frac{lx+m}{ax^2+bx+c}dx$ - Integration of Irrational functions $\int \frac{px+q}{\sqrt{ax^2+bx+c}}dx$ - Any expression of the form $\int \frac{dx}{(x-k)\sqrt{ax^2+bx+c}}$ - $\int \frac{dx}{a+b\cos x}$ (Integration of these types only)

UNIT II

Multiple Integrals: Definition of the double integral - Evaluation of the double Integral- Triple Integrals.

UNIT III

Improper Integrals: Beta and Gamma functions: Definitions - convergence of $\Gamma(n)$ - Recurrence formula of gamma functions - Properties of Beta functions - Relation between Beta and Gamma functions -Definite integrals using Gamma functions.

UNIT IV

Fourier Series- Definition - Fourier Series expansion of periodic functions with period 2π - Even and Odd functions.

UNIT V

Half-Range Fourier Series - Definition - Development in cosine series and sine series – Change of Interval - Combination of Series.

TEXT BOOKS:

S.No	Authors Name	Title of the Book	Publishers Name	Year of Publication
1.	S. Narayanan, T.K.Manicavachagam Pillai.	Calculus Vol II	S. Viswanathan (Printer & publishers), Pvt Ltd	2015
2.	S. Narayanan, T.K.Manicavachagam Pillai.	Calculus Vol III	S. Viswanathan (Printer & publishers), Pvt Ltd	2014

CHAPTERS AND SECTIONS:

UNIT	CHAPTER	SECTIONS
I	7 8 9	7.3 (Type II)[1] Case II and case V[1] Full [1]
II	5	2.1, 2.2 & 4 [1]
III	7	2.1-2.3, 3 to 5 [1]
IV	6	1, 2, 3 [2]
V	6	4, 5.1, 5.2, 6, 7 [2]

REFERENCE BOOKS:

S.No	Authors Name	Title of the book	Publishers Name	Year of Publication
1.	Shanti Narayan	Integral Calculus	S.Chand & Company Ltd	2002
2.	Shanti Narayan & P.K.Mittal	Integral Calculus	S.Chand & Company Ltd	2008
3.	U.P.Singh, R.J.Srivastava & N.H.Siddiqui	Integral Calculus	Wistom Press	2011
4.	J.K.Goyal & K.P.Gupta	Laplace and Fourier Transforms	Pragati Prakashan	2009

Pedagogy:

Power point presentation, Group Discussion, Seminar, Quiz, Assignment.

FIRST ALLIED COURSE-I (AC)

MATHEMATICAL STATISTICS – I

2019-2020 Onwards

Semester – I		**Hours/Week – 5**	
FIRST ALLIED COURSE-I	**MATHEMATICAL STATISTICS – I**	**Credits – 3**	
Course Code – 19UMA1AC1		**Internal**	**External**
		25	**75**

Objectives:

- To learn the basic concepts of statistics.
- To learn the basic ideas of statistical tools.

Course Outcomes:

On the successful completion of the course, students will be able to

CO Number	**CO Statement**	**Knowledge Level**
CO1	Describe the concept of probability theory and identify applications in real situations.	**K2**
CO2	Explain the derivation of moment generating function, characteristic function, probability generating function and the proof of Chebychev's inequality with its applications.	**K2**
CO3	Compute the index numbers by different types of methods.	**K3**
CO4	Define and Classify the two dimensional random variables.	**K3**
CO5	Interpret the various properties of expectation, variance and The concept of covariance.	**K3**
CO6	Distinguish between a discrete and a continuous random variable.	**K4**

Mapping with Programme Outcomes:

COs/ POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	S	S	S	S	S
CO2	S	S	S	S	S
CO3	S	S	M	S	S
CO4	S	S	S	S	S
CO5	S	S	S	S	S
CO6	S	S	S	S	S

S- Strong; M-Medium; L-Low

FIRST ALLIED COURSE-I (AC)

MATHEMATICAL STATISTICS – I

SYLLABUS

UNIT I

Theory of probability : Introduction – Short History – Definitions of Various Terms – Mathematical or Classical or 'a Priori' Probability – Statistical or Empirical Probability – Mathematical Tools: Preliminary Notion of sets – Sets and Elements of Sets – Operations on Sets – Algebra of Sets - Axiomatic approach to Probability – Random Experiment (Sample Space) – Event – Some Illustrations – Algebra of Events – Probability : Mathematical Notion – Probability Function – Laws of Addition of Probabilities – Extension of General Law of Addition of Probabilities – Law of Multiplication or Theorem of Compound Probability – Extension of Multiplication Law of Probability – Independent Events – Pair wise Independent Events – Mutually Independent Events – Baye's theorem.

UNIT-II

Random Variables and Distribution Functions : Random Variable – Distribution Functions – Properties of Distribution Function – Discrete Random Variable – Probability Mass Function – Discrete Distribution Function – Continuous Random Variable – Probability Density Function – Various Measures of Central Tendency, Dispersion, Skewness and Kurtosis for Continuous Probability Distribution Function – Continuous Distribution Function – Joint Probability Mass Function and Marginal and Conditional Probability Function – Joint Probability Distribution Function – Joint Density Function, Marginal Density Function - Independent Random Variables – The Conditional Distribution Function and Conditional Probability Density Function.

UNIT-III

Mathematical Expectation – Addition Theorem of Expectation – Multiplication Theorem of Expectation – Co-variance – Expectation of a Linear Combination of Random Variables – Variance of a Linear Combination of Random Variables – Expectation of a Continuous random variable – Conditional Expectation and Conditional Variance.

UNIT-IV

Moment Generating Function – Theorems on moment Generating Functions–

Cumulants– Additive Property of Cumulants – Effect of Change of Origin and Scale of Cumulants – Characteristic Function – Properties of Characteristic Functions – Uniqueness Theorem of Characteristic Functions – Chebychev's Inequality – Weak Law of Large Numbers– Bernoulli's Law of Large Numbers.

UNIT-V

Index numbers : Introduction – Meaning – Definition – Characteristics – Uses – Types of Index Numbers – Problems in the Construction of Index Numbers – Choice of Formula – Notations – Unweighted Index Numbers – Weighted Index Numbers – Quantity Index Numbers – Test of Consistency of Index numbers – Chain Base Method – Conversion of Chain Index into Fixed Index – Base Shifting – Splicing two Index Number Series – Deflating Index Numbers – Consumer Price Index – Meaning and Need – Uses – Construction of Consumer Price Index – Method of Constructing Consumer Price Index numbers – Aggregate Expenditure method – Family Budget method – Limitations of Index Numbers.

TEXT BOOKS:

S.No	Authors Name	Title of the Book	Publishers Name	Year of Publication
1.	S.C.Gupta & V.K.Kapoor	Elements Of Mathematical Statistics	Sultan Chand & Sons, New Delhi	2004
2.	R.S.N.Pillai & Bhagavathi	Statistics, Theory And Practice	S.Chand & Sons, New Delhi	2008

CHAPTERS AND SECTIONS:

UNIT	CHAPTER	SECTIONS
I	4	4.1 to 4.8 [1]
II	5	5.1 to 5.5.5 [1]
III	6	6.1 to 6.8 [1]
IV	6	6.9 to 6.13.1 [1]
V	14	Full [2]

REFERENCE BOOKS:

S.No	Authors Name	Title of the book	Publishers Name	Year of Publication
1.	S.C.Gupta & V.K.Kapoor	Fundamentals Of Mathematical Statistics	Sultan Chand & Sons.	2015
2.	T.Veerarajan	Probability, Statistics And Random Processes	Tata McGraw Hill education Private Limited	2010
3.	G.S.S.Bhisma Rao	Probability And Statistics	Scitech Publications (India) Pvt. Ltd	2011

Pedagogy:

Power point presentation, Group Discussion, Seminar, Quiz, Assignment.

SEMESTER II

CORE COURSE-III (CC)

ANALYTICAL GEOMETRY AND VECTOR CALCULUS

2020-2021 Onwards

Semester – II	ANALYTICAL GEOMETRY AND VECTOR CALCULUS	Hours/Week – 6	
CORE COURSE-III		Credits – 5	
Course Code – 20UMA2CC3		Internal 25	External 75

Objectives:

- To understand the concepts and properties of analytical geometry.
- To understand the concepts of plane, straight line and sphere.
- To familiarize the students with the principles and practices of vector calculus.
- To familiarize the students with vector integration.

Course Outcome:

On the Successful completion of the course the student would be able to

CO Number	CO Statement	Knowledge Level
CO1	Explain the coordinates in space, equation of a plane.	**K3**
CO2	Describe the concepts of straight lines and coplanar lines.	**K3**
CO3	Classify the equation of a sphere and tangent planes.	**K3**
CO4	Solve the problems of Gauss Divergence Theorem, Stokes Theorem- Green's Theorem.	**K3**
CO5	Examine the concepts of vector integration for finding scalar potential.	**K4**

Mapping with Programme Outcomes:

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	S	S
CO2	M	S	S	S	S
CO3	S	S	M	M	S
CO4	S	S	M	M	M
CO5	S	S	S	S	M

S-Strong, M-Medium, L-Low

CORE COURSE-III (CC)

ANALYTICAL GEOMETRY AND VECTOR CALCULUS

SYLLABUS

UNIT I:

Coordinate System: Introduction-Rectangular Cartesian Coordinates-Distance between two Points-Direction Cosines.

Planes: Equation of a Plane – Angle Between two Planes – Angle Bisectors of two Planes.

UNIT II:

Straight Lines: Equation of a Straight Line – A Plane and a Line – Equations of Two Skew Lines in a Simple form.

The Sphere: Introduction – Equation of a Sphere – Tangent Line and Tangent Plane – Section of a Sphere.

UNIT III:

Vector Differentiation: Introduction – Vector Algebra- Differentiation of Vectors – Gradient - Divergence and Curl.

UNIT IV:

Vector Integration - Line integrals-Normal Surface Integral $\int_S \vec{F}.\hat{n}dS$ -Flux across a Surface-Volume Integral $\int_V F.dv$

UNIT V:

Gauss's Divergence Theorem $\int_S \vec{F}.\hat{n}dS = \int_V div\,\vec{F}dv$ -Stoke's theorem $\int_C \vec{F}.\hat{n}d\vec{r} = \int_S curl\,\vec{F}.\,\hat{n}dS$ -Green's theorem-Stoke's theorem in space- Stoke's theorem in Cartesian form.

TEXT BOOKS:

S.No	Authors Name	Title of the Book	Publishers Name	Year of Publication
1.	S. Arumugam and A. Thangapandi Isaac	Analytical Geometry 3D & Vector Calculus	New Gamma Publishing House, 2011	2011
2.	M.L.Khanna	Vector Calculus	Jai Prakash Nath and Co.,	2002

CHAPTERS AND SECTIONS:

UNIT	CHAPTER	SECTIONS
I	I	1.0 - 1.3 [1]
	II	2.1 - 2.3[1]
II	III	3.1 - 3.3 [1]
	IV	4.0 - 4.3 [1]
III	V	5.0 - 5.4 [1]
IV	III	1 – 4 [2]
V	III	5 – 8 [2]

REFERENCE BOOKS:

S.No	Authors Name	Title of the book	Publishers Name	Year of Publication
1.	P.Duraipandiyan, Lakshmi Duraipandian and D.Muhilan	Analytical Geometry Three dimensionsal	Emerald Publishers	1984
2.	H.D.Pandey, M.Q.Khan and B.N.Gupta	A Text Book of Analytical Geometry and Vector Analysis	Wisdom Press	2011
3.	P.Duraipandiyan and Lakshmi Duraipandian	Vector Analysis	Emerald Publishers	1986

Pedagogy:

Power point presentation, Group Discussion, Seminar, Quiz, Assignment.

FIRST ALLIED COURSE – II (AP)

MATHEMATICAL STATISTICS – II (PRACTICAL)

2019-2020 Onwards

Semester – II	**MATHEMATICAL STATISTICS – II (PRACTICAL)**	**Hours/Week – 5**	
FIRST ALLIED COURSE-II		**Credits – 3**	
Course Code – 19UMA2AC1P		**Internal 40**	**External 60**

Objectives:

- To analyze the statistical problems.
- To provide the knowledge to interpret and solve the statistical problems.
- To ensure with the ideas of statistical tools.

Course Outcome:

On the Successful completion of the course the student would be able to

CO Number	**CO Statement**	**Knowledge Level**
CO1	Identify the discrete and continuous data and find average through the Measures of Central Tendency and Measures of Dispersion.	**K1**
CO2	Solve the problems in joint, Marginal and Conditional Probability distributions involving two random variables.	**K2**
CO3	Explain the various methods of finding Correlation and Regression co-efficient between two data sets and their applications.	**K2**
CO4	Describe and illustrate the concepts of fitting probability distributions.	**K2**
CO5	Analyze the concepts of testing of hypothesis and apply the test to the real life problems.	**K3**

Mapping with Programme Outcomes:

COs/POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	M	S	S	S	S
CO2	M	S	M	S	S
CO3	S	S	S	S	S
CO4	S	S	S	S	S
CO5	S	S	S	S	S

S-Strong, M-Medium, L-Low

FIRST ALLIED COURSE – II (AP)

MATHEMATICAL STATISTICS – II (PRACTICAL)

SYLLABUS

UNIT I

Measures of central tendency: Arithmetic Mean – Median – Quartiles – Deciles – Percentiles – Mode – Geometric Mean – Harmonic Mean – Measures of Dispersion: Range and Quartile Deviation – Mean Deviation – Standard Deviation –Co-efficient of variation – Skewness – Moments – Kurtosis.

UNIT II

Karl Pearson's Coefficient of Correlation – Rank correlation – Regression.

UNIT III

Theoretical Distributions: Binomial Distribution – Poisson Distribution – Normal Distribution.

UNIT IV

Two-dimensional Random Variables – Two-dimensional or Joint Probability Mass Function – Two-dimensional Distribution Function – Marginal Distribution Function – Joint Density Function, Marginal Density Function – The Conditional Distribution Function and Conditional Probability Density Function (Problems only).

UNIT V

Tests of Hypotheses: Test of Significance for Large Samples – Test of significance of the difference between sample proportion and population proportion – Test of significance of the difference between two sample proportions – Test of significance of the difference between sample mean and population mean – Test of significance of the difference between the mean two samples – Test of significance of the difference between sample S.D. and population S.D.– Test of significance of the difference between S.D.'s of two large samples – Test of Significance for small Samples : Tests of significance based on t-test for Mean – F-test for Variance - Chi-square test for goodness of fit and independence of attributes (Problems only).

TEXT BOOKS:

S.No	Authors Name	Title of the Book	Publishers Name	Year of Publication
1.	R.S.N. Pillai and Bagavathi.	Practical Statistics	Sultan Chand & Sons.	2008
2.	S.C.Gupta & V.K.Kapoor	Fundamentals Of Mathematical Statistics	Sultan Chand & Sons.	2015
3.	T.Veerarajan	Probability, Statistics And Random Processes	Tata McGraw Hill education Private Limited	2010

CHAPTERS AND SECTIONS:

UNIT	CHAPTER	SECTIONS
I	3 , 4 , 5	FULL [1]
II	6 , 7	FULL [1]
III	13	FULL [1]
IV	5	5.5, 5.5.1-5.5.5 [2]
V	9	FULL [3]

REFERENCE BOOKS:

S.No	Authors Name	Title of the book	Publishers Name	Year of Publication
1.	R.S.N.Pillai & Bhagavathi	Statistics, Theory And Practice	S.Chand & Sons	2008
2.	V.Rajagopalan	Selected Statistical Tools	New Age International (P) Ltd Publishers	2006
3.	G.S.S.Bhisma Rao	Probability and Statistics	Scitech Publications (India) Private Limited, New Delhi	2011

Pedagogy:

Power point presentation, Group Discussion, Seminar, Quiz, Assignment.

LIST OF PROGRAMS:

1) Arithmetic Mean, Geometric Mean and Harmonic Mean.
2) Median and Mode.
3) Quartile Deviation and Mean Deviation.
4) Standard Deviation and Co-efficient of Variation.
5) Karl Pearson's Co-efficient of Skewness.
6) Bowley's Co-efficient of Skewness.
7) Moments and Kurtosis.
8) Karl Pearson's Co-efficient of correlation.
9) Rank Correlation.
10) Fit a regression line.
11) Fit a Binomial distribution.
12) Fit a Poisson distribution.
13) Fit a Normal distribution.
14) Marginal and conditional distribution for X and Y.
15) Mathematical Expectation for X and Y.
16) Test the hypothesis of the difference between two sample means.
17) Test the hypothesis for single proportion.
18) Test the significance of hypothesis using 't' test.
19) Test the significance of hypothesis using 'F' test.
20) Test the significance of hypothesis using chi-square test.

FIRST ALLIED COURSE – III (AC)

MATHEMATICAL STATISTICS – III

2019-2020 Onwards

Semester – II	**MATHEMATICAL STATISTICS – III**	**Hours/Week – 5**	
FIRST ALLIED COURSE-III		**Credits – 3**	
Course Code – 19UMA2AC2		**Internal 25**	**External 75**

Objectives:

- To enable the students to learn the basic concepts of discrete distribution.
- To make the students analyze the concepts of continuous distribution.
- To ensure the students with the ideas of statistical tools.

Course Outcome:

On the Successful completion of the course the student would be able to

CO Number	**CO Statement**	**Knowledge Level**
CO1	Define the chi square Distribution and discuss the applications of chi square Distribution to conduct tests of goodness of fit and independence of attributes.	**K2**
CO2	Explain Student's t, Fisher's t and F statistics and derive their probability Distribution.	**K2**
CO3	Identify the concepts of a discrete probability Distribution and compute the moments, Cumulants, m.g.f and various constants of a discrete probability Distribution and its applications.	**K3**
CO4	Describe the concepts of a continuous probability Distribution and compute the moments, Cumulants, m.g.f and various constants of a continuous probability Distribution and its applications.	**K3**
CO5	Classify the various properties of the correlation and regression co- efficient and their applications.	**K3**

Mapping with Programme Outcomes:

COs/POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	S	S	S	S	S
CO2	S	S	M	S	S
CO3	S	S	S	S	S
CO4	S	S	S	S	S
CO5	S	S	S	S	S

S-Strong, M-Medium, L-Low

FIRST ALLIED COURSE – III

MATHEMATICAL STATISTICS – III

SYLLABUS

UNIT I

Introduction – Discrete uniform Distribution – Bernoulli Distribution : Moments of Bernoulli Distribution - Binomial Distribution : Moments of Binomial Distribution – Recurrence Relation for the Moments of Binomial Distribution – Factorial Moments of Binomial Distribution –Mean Deviation about Mean of Binomial Distribution – Mode of Binomial Distribution – Moment Generating Function of Binomial Distribution – Additive Property of Binomial Distribution –Characteristic Function of Binomial Distribution – Cumulants of the Binomial Distribution –Poisson Distribution : The Poisson Process – Moments of the Poisson Distribution – Mode of the Poisson Distribution – Recurrence Relation for Moments of the Poisson Distribution – Moment Generating Function of the Poisson Distribution – Characteristic Function of the Poisson Distribution – Cumulants of the Poisson Distribution – Additive or Reproductive Property of Independent Poisson Variates – Probability Generating Function of Poisson Distribution.

UNIT II

Introduction – Normal Distribution : Normal Distribution as a Limiting Form of Binomial Distribution – Chief Characteristics of the Normal Distribution and Normal Probability curve – Mode of Normal Distribution – Median of Normal Distribution – M.G.F. of Normal Distribution – Cumulant Generating Function (c.g.f.) of Normal Distribution – Moments of Normal Distribution – A Linear Combination of Independent Normal Variates – Points of Inflexion of Normal Curves – Mean Deviation About the Mean for Normal Distribution – Area Property (Normal Probability Integral) – Error Function – Importance of Normal Distribution – Fitting of Normal Distribution – Rectangular (or Uniform) Distribution : Moments ofRectangular Distribution – M.G.F. of Rectangular Distribution – Characteristic Function of Rectangular Distribution – Mean Deviation (about mean) of Rectangular Distribution.

UNIT III

Gamma Distribution : M.G.F. of Gamma Distribution – Cumulants Generating Function of Gamma Distribution – Additive Property of Gamma Distribution – Beta Distributions of first kind : Constants of Beta Distributions of first kind – Beta Distributions of second kind : Constants of Beta Distributions of second kind – Exponential Distribution : Moment Generating Function of Exponential Distribution.

UNIT IV

Correlation : Introduction – Meaning of Correlation – Scatter Diagram – Karl Pearson's Co-efficient of Correlation : Limits for Correlation Co-efficient – Assumptions Underlying Karl Pearson's Correlation Co-efficient – Rank Correlation : Spearman's Rank Correlation Co-efficient – Repeated Ranks – Repeated Ranks (continued) – Linear Regression : Introduction – Linear Regression : Regression Co-efficient - Properties of Regression Co-efficient – Angle between two lines of Regression – Standard Error of Estimate or Residual Variance – Correlation Co-efficient between Observed and Estimated Values.

UNIT V

Chi-Square Distribution : Introduction – Derivation of the Chi-Square Distribution –M.G.F. of Chi-Square Distribution : Cumulant Generating Function of χ^2 Distribution – Limiting Form of χ^2 Distribution for large degree of Freedom –Characteristic Function of χ^2 Distribution – Mode and Skewness of χ^2 Distribution – Additive Property of χ^2 Variates – Chi- Square Probability Curve – Students'' Distribution : Introduction – Derivation of the Students't' Distribution – Fisher's't' – Distribution of Fisher's't' – Constants of t-distribution – Limiting Form of 't' Distribution – Graph of 't' Distribution – Critical Values of t – F-Distribution : Derivation of Snedecor's F- Distribution – Constants of F– Distribution – Mode and Points of Inflexion of F- Distribution – Relation between t and F Distributions – Relation between F and χ^2 Distributions.

TEXT BOOKS:

S.No	Authors Name	Title of the Book	Publishers Name	Year of Publication
1.	S.C.Gupta & V.K.Kapoor	Fundamentals Of Mathematical Statistics	Sultan Chand & Sons.	2015

CHAPTERS AND SECTIONS:

UNIT	CHAPTER	SECTIONS
I	8	8.1 to 8.5.9 (omit 8.4.10 to 8.4.12 and 8.5.10) [1]
II	9	9.1 to 9.3.4 (omit 9.2.15) [1]
III	9	9.5 to 9.8.1 [1]
IV	10 11	10.1 to 10.4.2 & 10.7, 10.7.1 to 10.7.3 [1] 11.1 to 11.2.5 [1]
V	15 16	15.1 to 15.3.6 [1] 16.1 to 16.2.7, 16.5, 16.5.1 to 16.5.3, 16.7, 16.8 [1]

REFERENCE BOOKS:

S.No	Authors Name	Title of the book	Publishers Name	Year of Publication
1.	S.C.Gupta & V.K.Kapoor	Elements Of Mathematical Statistics	Sultan Chand & Sons	2004
2.	R.S.N.Pillai & Bhagavathi	Statistics, Theory And Practice	S.Chand & Sons	2008
3.	G.S.S.Bhishma Rao	Probability And Statistics	Scitech Publications (India) Pvt Ltd	2011

Pedagogy:

Power point presentation, Group Discussion, Seminar, Quiz, Assignment.

SEMESTER III

CORE COURSE-IV (CC)

DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS

2019-2020 Onwards

Semester – III	DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS	Hours/Week – 5	
CORE COURSE-IV		Credits – 5	
Course Code – 19UMA3CC4		Internal 25	External 75

Objectives:

- To give an in-depth knowledge of solving Ordinary differential equations including separable, homogeneous, exact, and linear.
- To acquire the knowledge of solving problems using partial differential equations.
- To know the concepts of Laplace transforms and the Inverse Laplace transforms with applications.

Course Outcome:

On the Successful completion of the course the student would be able to

CO Number	CO Statement	Knowledge Level
CO1	Define Laplace transform & its inverse.	**K1**
CO2	Illustrate the notion of order & degree of the ordinary differential equations.	**K2**
CO3	Rephrase the partial differential equations by eliminating constants and arbitrary functions.	**K2**
CO4	Apply the method of variation of parameters for finding the solutions of second order ordinary differential equations.	**K3**
CO5	Compute general, singular & particular integrals for standard forms.	**K3**
CO6	Solve the ordinary differential equations by Laplace Transforms and inverse Laplace transforms.	**K3**

Mapping with Programme Outcomes:

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	S	S
CO2	M	M	M	M	S
CO3	S	S	S	S	M
CO4	S	S	S	S	M
CO5	S	S	S	S	M
CO6	S	S	S	S	M

S-Strong, M-Medium, L-Low

CORE COURSE-IV (CC)

DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS

SYLLABUS

UNIT – I:

Equations of the first order but of higher degree:

Equations solvable for dy/dx – Equations solvable for y – Equations solvable for x – Clairaut's form – Extended form of Clairaut's form – Exact differential equations – Conditions of integrability of $M\,dx + N\,dy = 0$ – Practical rule for solving an exact differential equation – Rules for finding integrating factors – simple problems.

UNIT –II:

Linear equations with constant coefficients:

Definition – The operator D – Complementary function of a linear equation with constant coefficients – Particular integral – General method of finding P.I. – Special methods for finding P.I. of the forms e^{ax}, $\cos ax$ or $\sin ax$, $e^{ax}V$, x^m – Linear equations with variable coefficients – Methods of finding particular integrals – Special method of evaluating the P.I. when X is of the form x^m – Method of Variation of Parameters (Omit third & higher order equations).

UNIT –III:

Partial differential equations of the first order:

Classification of Integrals – Derivation of partial differential equations – By elimination of constants – By elimination of an arbitrary function – Lagrange's method of solving the linear equation – Special methods for some standard forms $F(p,q) = 0, F(x,p,q) = 0, F(y,p,q) = 0, F(z,p,q) = 0, f_1(x,p) = f_2(y,q)$ – Clairant's form – Equations reducible to the standard forms – Charpit's method – Solving of few standard forms from Charpit's method.

UNIT – IV:

Partial differential equations of higher order:

Introduction – Homogeneous differential equation – Methods of finding C.F. – Methods of finding P.I. of the forms e^{ax+by}, $x^r y^s$, $\sin(ax+by)$ or $\cos(ax+by)$, $e^{ax+by}\phi(x,y)$, $\sin ax \sin by$ or $\cos ax \cos by$.

UNIT – V:

Laplace transforms & inverse laplace transforms:

Definition – Piecewise continuity – Sufficient conditions for the existence of the Laplace Transforms – Basic results – Laplace Transform of periodic functions – Some general

theorems & simple applications – Evaluation of certain integrals using Laplace Transform – The Inverse Laplace Transforms –Modification of results in Laplace Transform to get the inverse Laplace Transform – Use of Laplace Transforms in solving ODE with constant coefficients.

TEXT BOOKS:

S.No	Authors Name	Title of the Book	Publishers Name	Year of Publication
1.	S.Narayanan & T.K.Manicavachagom Pillay	Differential Equations And Its Applications	S.Viswanathan Publishers Pvt. Ltd	2016
2.	Dr.S.Arumugam & Mr.A.Thangapandi Isaac	Differential Equations And Applications	New Gamma publishing House	2014

CHAPTERS AND SECTIONS:

UNIT	CHAPTER	SECTIONS
I	4	1-3 [1]
	2	6 [1]
II	5	1-5 [1]
	8	4 [1]
III	12	1-6 [1]
IV	5	1-2 [2]
V	9	1-8 [1]

REFERENCE BOOKS:

S.No	Authors Name	Title of the book	Publishers Name	Year of Publication
1.	M.D.Raisinghania	Ordinary and Partial Differential Equations	S.Chand & Company	2008

Pedagogy:

Power point presentation, Group Discussion, Seminar, Quiz, Assignment.

CORE COURSE-V (CC)

CLASSICAL ALGEBRA AND THEORY OF EQUATIONS

2019-2020 Onwards

Semester - III	CLASSICAL ALGEBRA AND THEORY OF EQUATIONS	Hours/Week – 5	
CORE COURSE-V		Credits – 5	
Course Code – 19UMA3CC5		Internal 25	External 75

Objectives:

- To establish a sound knowledge on theory of equations.
- To inculcate the students in applicable algebra.

Course Outcome:

On the Successful completion of the course the student would be able to

CO Number	CO Statement	Knowledge Level
CO1	Explain relation between roots and co-efficients of Polynomial equations.	K2
CO2	Apply symmetric functions in solving equations and find sum of r^{th} power of roots.	K3
CO3	Compute transformation of equations and solve Reciprocal equations.	K3
CO4	Interpret the quotient and remainder, Find removal of terms and form an equation whose roots are any power.	K2
CO5	Describe transformation in general with Descarte's rule of signs.	K2
CO6	Classify inequalities in all manners.	K3
CO7	Explain theory of numbers with its applications.	K2

Mapping with Programme Outcomes:

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	S
CO2	S	S	S	S	S
CO3	S	S	M	S	M
CO4	S	M	S	S	S
CO5	S	S	M	S	M
CO6	S	S	S	S	S
CO7	S	S	S	S	S

S-Strong, M-Medium, L-Low

CORE COURSE-V (CC)

CLASSICAL ALGEBRA AND THEORY OF EQUATIONS

SYLLABUS

UNIT I

Relation between the roots and coefficients of Equations – Symmetric function of the roots – Sum of the powers of the roots of an equation

UNIT II

Newton's theorem on the sum of the power of the roots-Transformations of Equations– Reciprocal equations – To increase or decrease the roots of a given equation by a given quantity.

UNIT III

Form of the quotient and remainder when a polynomial is divided by a binomial – Removal of terms – To form of an equation whose roots are any power of the roots of a given equation – Transformation in general – Descarte's rule of signs.

UNIT IV

Inequalities – Elementary principles – Geometric & Arithmetic means – Weirstrass inequalities – Cauchy inequality – Applications to Maxima & Minima.

UNIT V

Theory of Numbers – Prime & Composite numbers – divisors of a given number N – Euler'sFunction (N) and its value –Integral part of a real number – The highest Power of a prime P contained in n! – Congruences –Fermat's, Wilson's & Lagrange's Theorems.

TEXT BOOKS:

S.No	Authors Name	Title of the Book	Publishers Name	Year of Publication
1.	T.K.Manickavasagam Pillai & others	Algebra, Volume I	S.V. publications	1985
2.	T.K.Manickavasagam Pillai & others	Algebra, Volume I	S.V. publications	1985

CHAPTERS AND SECTIONS:

UNIT	CHAPTER	SECTIONS
I	6	11-13 [1]
II	6	14-17 [1]
III	6	18-21 & 24[1]
IV	4	1-13 [2]
V	5	1-18 [2]

REFERENCE BOOKS:

S.No	Authors Name	Title of the book	Publishers Name	Year of Publication
1.	H.S.Hall & S.R.Knight	Higher Algebra	Prentice Hall of India, New Delhi	1948
2.	Barnard S & Child	Higher Algebra	J.M.Publication	1936

Pedagogy:

Power point presentation, Group Discussion, Seminar, Quiz, Assignment.

SECOND ALLIED COURSE-I (AC)

PYTHON PROGRAMMING

2021-2022 Onwards

Semester - III	**PYTHON PROGRAMMING**	**Hours/Week – 4**	
Second Allied Course-I		**Credits – 3**	
Course Code – 21UMA3AC3		**Internal 25**	**External 75**

Objectives:

- To understand the concepts of Python programming language.
- To provide basic idea on user defined functions of Python programming.
- To inculcate the uses of built in data types of Python programming on real time data.

Course Outcomes:

On the successful completion of the course, students will be able to

CO Number	**CO Statement**	**Knowledge Level**
CO1	Understand Python's core data types, input and output statements	**K2**
CO2	Demonstrate different decision making statements	**K2**
CO3	Explain Loop control statements and functions	**K2**
CO4	Apply the List, Tuple and Dictionaries concepts	**K3**

Mapping With Programme Outcomes*:*

Cos/Pos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	S	S	M	M	M
CO2	M	M	M	M	M
CO3	M	S	S	M	M
CO4	S	S	M	M	M

S – Strong; M – Medium; L – Low

SECOND ALLIED COURSE-I (AC)

PYTHON PROGRAMMING

SYLLABUS

UNIT - I:

Basics of Python Programming **(12 HOURS)**

Introduction- Python Character Set-Token-Python Core Data Type- The print () Function- Assigning value to a variable-Multiple Assignments- Writing Simple Programs in Python- The input() Function –Formatting Number and String

UNIT - II: Operators, Expressions and Decision Statements **(12 HOURS)**

Operators and Expressions:

Introduction- Operators and Expressions- Arithmetic Operators- Operator Precedence and Associatively-Bitwise Operator.

Decision Statements:

Introduction-Boolean Operators- Using Numbers with Boolean Operators- Using String with Boolean Operators- Boolean Expressions and Relational Operators-Decision Making Statements

UNIT - III: Loop Control Statements and Functions **(12 HOURS)**

Loop Control Statements:

Introduction-The while Loop-The range () function-The for Loop- Nested Loops-The break Statement- The continue Statement.

Functions:

Introduction-Syntax and Basics of a Function- Use of a Function- Parameters and Arguments in a Function-The return Statement- The Lambda Function

UNIT - IV: Strings and Lists **(12 HOURS)**

Strings:

Introduction- The Str Class- the basic inbuilt python functions for string- the index [] operator- Traversing string with for and while loop- Immutable strings- The string operators- String operations.

Lists:

Introduction-Creating Lists-Accessing the elements of the List – Python inbuilt functions for Lists-List operator-List methods

UNIT - V: Tuples, Sets, Dictionaries **(12 HOURS)**

Tuples, Sets and Dictionaries:

Introduction to Tuples-Sets-Dictionaries.

TEXT BOOK:

1. Ashok Namdev Kamthane and Amith Ashok Kamthane, "**Programming and Problem Solving with PYTHON**", McGraw Hill Education (India) Private Limitted. ©2018.

REFERENCE BOOKS:

1. Dr.R. Nageswara Rao Core Python Programming Dreamtech Press 2017.
2. Ch Satyanarayana, M Radhika Mani & B N Jagadesh, "Python Programming", Universities Press, 2018.
3. Jeeva Jose and P. Sojan Lal, "Introduction to Computing and Problem Solving with Python", Khanna Book Publising Co. (P) Ltd., 2016.

WEB LINKS:

1. www.learnpython.org/
2. https://www.codecademy.com/learn/python
3. https://www.Codementor.io
4. https://www.Python.org

PEDAGOGY:

Power point Presentation, Assignments, Group Discussion and e-contents.

COURSE DESIGNER:

Mrs.K.Akila, Assistant Professor, Department of Computer Applications

SECOND ALLIED COURSE-II (AP)

PYTHON PROGRAMMING LAB

2021-2022 Onwards

Semester - III	**PYTHON PROGRAMMING LAB**	**Hours/Week – 2**	
Second Allied Course-II		**Credits – 2**	
Course Code – 21UMA3AC2P		**Internal 40**	**External 60**

OBJECTIVE:

- To know the basics of problem solving.
- To understand and write simple python programs.
- To develop python programs with decision making and conditional loops.
- To create user defined functions on python.

COURSE OUTCOME:

On the successful completion of the course, students will be able to

CO NUMBER	**CO STATEMENT**	**KNOWLEDGE LEVEL**
CO1	Understand and apply Python's basic concepts	K2
CO2	Demonstrate different data types and its usage	K2
CO3	Use the knowledge of functions	K3

MAPPING WITH PROGRAMME OUTCOMES:

Cos/Pos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	M	S	M	M	M
CO2	M	M	M	M	M
CO3	S	S	S	M	M

S- Strong**; M-**Medium**; L-**Low

LIST OF PRACTICALS

1. Get inputs from user and display them
2. Develop a calculator

3. Implement Decision making and Loop control statements
4. Create and call an user defined function
5. Strings and their built-in functions
6. List and their built-in functions
7. Working with Tuples
8. Working with Dictionaries

WEB REFERENCES:

1. https://www.programiz.com/python-programming
2. https://www.tutorialspoint.com/python
3. https://www.w3schools.com/python

PEDAGOGY:

Power Point Presentation, Demonstration

NON-MAJOR ELECTIVE COURSE – I (NME)

MATHEMATICS FOR COMPETITIVE EXAMINATION-I

2019-2020 Onwards

<table>
<tr><td>Semester - III</td><td rowspan="3">MATHEMATICS FOR COMPETITIVE EXAMINATION-I</td><td colspan="2">Hours/Week – 2</td></tr>
<tr><td>NON-MAJOR ELECTIVE COURSE – I</td><td colspan="2">Credits – 2</td></tr>
<tr><td>Course Code – 19UMA3NME1</td><td>Internal
25</td><td>External
75</td></tr>
</table>

Objectives:

- To provide the knowledge to analyze, interpret and solve the Mathematical problems.
- To develop the thinking capacity to solve the problems.
- To study many short tricks to solve the mathematical problems easily.

Course Outcomes:

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Solve the Problems on Numbers and Problems on Ages.	**K2**
CO2	Explain the concept of time and distance, Calendar and Clock.	**K2**
CO3	Apply the concept of Data Interpretation in various types of Graphs.	**K3**
CO4	Distinguish the concept of Series Codes, Relationships, Analogy and Classification.	**K3**
CO5	Explain the concept of Logical Reasoning.	**K3**

Mapping With Programme Outcomes:

Cos/Pos	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	S	S
CO2	M	S	S	S	S
CO3	S	S	M	M	S
CO4	S	S	M	M	M
CO5	S	S	S	S	M

S – Strong; M – Medium; L – Low

NON-MAJOR ELECTIVE COURSE – I (NME)

MATHEMATICS FOR COMPETITIVE EXAMINATION-I

SYLLABUS

UNIT I

Problems on Numbers – Problems on Ages.

UNIT II

Time and Distance – Calendar – Clocks.

UNIT III

Data Interpretation: Tabulation – Bar Graphs – Pie Charts – Line Graphs.

UNIT IV

Reasoning (Including Mathematical): Series – Codes – Relationship – Analogy – Classification.

UNIT V

Logical Reasoning.

Text Books:

S. No	Authors	Title of the Book	Publishers/Edition	Year of Publication
1.	R. S.Aggarwal	Quantitative Aptitude – For Competitive Examinations (Fully Solved)	S.Chand & Company Pvt.Ltd,	Reprint 2015
2.	Dr. K.Kautilya	UGC NET/JRF/SET Teaching & Research Aptitude (General Paper - I)	UPKAR PRAKASHAN, AGRA – 2, Sixth Edition	2017

CHAPTERS AND SECTIONS:

UNIT	CHAPTER	SECTIONS
I	7, 8	161 – 194 [1]
II	17 27,28	384 – 404 [1] 593 – 604 [1]
III	36,37,38,39	659 – 726 [1]
IV	5	132 – 161 [2]
V	6	162 – 190 [2]

REFERENCE BOOKS:

S. No	Authors	Title of the Book	Publishers/ Edition	Year of Publication
1.	Edgar Thorpe	Test of Reasoning for Competitive Examinations	Tata McGraw-Hill Publishing Company Limited, New Delhi, 2nd Edition,	3rd Re-Print 2000.
2	T.K. Sinha	80+ Practice Sets of Quantitative Aptitude for Bank PO Exams	Arihant Publication (India) limited	2002.

Pedagogy:

Chalk and Talk, PPT, Discussion and Quiz

SEMESTER IV

CORE COURSE VI – (CC)

SEQUENCES AND SERIES

2019-2020 Onwards

Semester - IV	SEQUENCES AND SERIES	Hours/Week – 6	
Core Course - VI		Credits – 5	
Course Code – 21UMA4CC6		Internal 25	External 75

Objectives:

- To lay a good foundation for classical analysis.
- To study the behavior of sequences and series.
- To acquire the knowledge of solving problems in Binomial, Logarithm & Exponential Series.

Course Outcomes:

On the Successful completion of the course, students will be able to

CO No.	CO Statement	Knowledge Level
CO1	Explain the concepts of convergent sequences, divergent sequences and series.	K2
CO2	Apply the ideas of sequences in Algebra of limits.	K3
CO3	Compute the behavior of monotonic functions.	K3
CO4	Apply the theory of Cauchy's condensation test and Cauchy's root test on series.	K3
CO5	Solve the problems based on binomial, logarithmic and exponential series.	K3
CO6	Examine infinite series using D' Alembert's ratio test.	K4

Mapping with Programme Outcome:

COS/POS	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	M	S
CO2	S	S	S	S	S
CO3	S	S	S	M	M
CO4	S	S	S	M	M
CO5	S	M	S	S	S
CO6	S	S	S	S	M

S-Strong, M-Medium, L-Low

CORE COURSE VI – (CC)

SEQUENCES AND SERIES

SYLLABUS

UNIT – I **(15 Hours)**

Introduction – Sequences – Bounded Sequences – Monotonic Sequences – Convergent Sequences – Divergent and Oscillating Sequences – The Algebra of Limits.

UNIT –II **(15 Hours)**

Behavior of Monotonic sequences – Some theorems on limits –Subsequences.

UNIT –III **(15 Hours)**

Infinite Series – Definition of Convergence, Divergence & Oscillate – Convergence of Geometric series – Some general theorems concerning infinite series – Series of positive terms – Comparison tests- convergence of $\sum \frac{1}{n^k}$ – D' Alembert's Ratio test.

UNIT – IV **(10 Hours)**

Cauchy's Condensation test – Cauchy's Root test and simple problems – Absolute Convergence – Conditional Convergence – Alternative Series.

UNIT – V **(20 Hours)**

Binomial theorem for a rational index – Some important particular case of the Binomial expansion – Sign of terms in binomial expansion – Numerically greatest term expansions – Method of splitting functions into partial fractions – Application of the Binomial theorem to the summation of series – Approximate values – Exponential limit – The Exponential theorem – Summation – The Logarithmic series – Modification of the logarithmic series – Summation of series– Euler's constant – Series which can be summed up by the logarithmic series – Calculation of logarithms by means of the logarithmic series.

TEXT BOOKS:

S. No.	Authors Name	Title of the Book	Publishers Name	Year of Publication
1.	Dr.S.Arumugam & Prof.A.Thangapandi Isaac	Sequences and Series	New Gamma Publishing House	2015
2.	T.K.Manicavachagom Pillay, T.Natarajan & K.S.Ganapathy	Algebra, Volume I	S.Viswanathan Pvt Limited	2015

CHAPTERS AND SECTIONS:

UNIT	CHAPTER	SECTIONS
I	3	3.0-3.6 [1]
II	3	3.7-3.9 [1]
III	2	8-14, 16 [2]
IV	2	15, 17, 21-24 [2]
V	3	5-10, 14 [2]
	4	1-3, 5-10 [2]

REFERENCE BOOKS:

S.No.	Authors Name	Title of the Book	Publishers Name	Year of Publication
1.	M.K.Singal & Asha Rani Singal	A First Course in Real Analysis	R. Chand &co	2018
2.	N.P.Bali	Golden Maths series -Real Analysis	Laxmi Publication	2019

Web links:

1. **https://youtu.be/JKiwztS6e_s**
2. **https://youtu.be/A02NqndQan0**
3. **https://youtu.be/9sLsX9DV5Fs**
4. **https://youtu.be/Q3_IGStTGVQ**
5. **https://youtu.be/BydVprh9NgQ**

Pedagogy:

Power point presentation, Group Discussion, Seminar, Assignment.

CORE COURSE – VII (CC)

METHODS IN NUMERICAL ANALYSIS

2021-2022 Onwards

<table>
<tr><td>Semester – IV</td><td rowspan="3">METHODS IN NUMERICAL ANALYSIS</td><td colspan="2">Hours/Week –4</td></tr>
<tr><td>Core Course – VII (CC)</td><td colspan="2">Credits – 3</td></tr>
<tr><td>Course Code – 21UMA4CC7</td><td>Internal
25</td><td>External
75</td></tr>
</table>

Objectives:

- To introduce the basic concepts of solving algebraic and transcendental equations.
- To introduce the numerical techniques of interpolation in various intervals.
- To understand the knowledge of numerical techniques of differentiation and integration.

Course Outcomes:

On the Successful completion of the course the student would be able to

CO Number	CO Statement	Knowledge Level
CO1	Apply numerical methods to solve Algebraic, Transcendental equations.	**K2**
CO2	Explain and solve the numerical techniques of interpolation in various intervals.	**K2**
CO3	Solve numerical integration and differentiation.	**K3**
CO4	Solve the system of linear equation with understanding by appropriate methods.	**K3**
CO5	Compute the numerical solution of ordinary differential equation by various methods.	**K3**

Mapping with Programme Outcomes:

COS/POS	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	S
CO2	S	S	S	S	S
CO3	M	M	S	S	S
CO4	M	M	S	S	S
CO5	S	S	S	S	S

S-Strong, M-Medium, L-Low

CORE COURSE – X (CC)
METHODS IN NUMERICAL ANALYSIS
SYLLABUS

UNIT I **(15 Hours)**

SOLUTION OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS:

Introduction – Method of False Position – Iteration Method – Newton-Raphson Method – Ramanujan's Method – Secant Method – Muller's Method.

UNIT II **(15 Hours)**

INTERPOLATION:

Introduction – Errors in Polynomial Interpolation – Finite Differences –Newton's Formulae for Interpolation – Interpolation with Unevenly Spaced Points: Lagrange's Interpolation Formula – Divided Differences and Their Properties: Newton's General Interpolation Formula.

UNIT III **(15 Hours)**

NUMERICAL DIFFERENTIATION AND INTEGRATION:

Introduction – Numerical Differentiation – Numerical Integration: Trapezoidal Rule – Simpson's 1/3 Rule – Simpson's 3/8 Rule – Boole's and Weddle's Rules –Use of Cubic Splines – Romberg Integration – Newton-Cotes Integration Formulae.

UNIT IV **(15 Hours)**

NUMERICAL LINEAR ALGEBRA:

Introduction – Solution of Linear Systems – Direct Methods : Gauss Elimination – Necessity for pivoting – Gauss-Jordan Method – Modification of the Gauss Method to Compute the Inverse – Solution of Linear Systems – Iterative Methods.

UNIT V **(15 Hours)**

NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS:

Introduction – Solution by Taylor's Series – Picard's Method of Successive Approximations – Euler's Method: Modified Euler's Method, Runge - Kutta Methods – Predictor – Corrector Methods.

TEXT BOOKS:

S. No.	Authors Name	Title of the Book	Publishers Name	Year of Publication
1.	S. S. Sastry	Introductory Methods of Numerical Analysis	Fifth Edition , PHI Learning Private Limited, Delhi	2018

CHAPTERS AND SECTIONS:

UNIT	CHAPTER	SECTION
I	2	2.1, 2.3 – 2.8
II	3	3.1 – 3.3, 3.6, 3.9 (3.9.1 Only) & 3.10 (3.10.1 Only)
III	6	6.1, 6.2 & 6.4
IV	7	7.1, 7.5 (7.5.1– 7.5.4) & 7.6
V	8	8.1–8.3, 8.4(8.4.2 Only), 8.5 & 8.6

REFERENCE BOOKS:

S.No.	Authors Name	Title of the Book	Publishers Name	Year of Publication
1.	M.K. Jain, S.R.K. Iyengar and R.K. Jain	Numerical Methods for Scientific and Engineering Computations	New Age International Private Limited	1999
2.	C.E. Froberg	Introduction to Numerical Analysis	II Edition , Addison Wesley	1979
3.	Dr. P. Kandasamy, Dr.K. Thiligavathy and Dr.K. Gunavathi	Numerical Methods	S. Chand & Company Pvt.	2013

Web links:

1. **https://www.youtube.com/watch?v=3j0c_FhOt5U**
2. **https://nptel.ac.in/courses/111/107/111107105/**
3. **https://www.youtube.com/watch?v=0rtaUUonwkU**
4. **https://nptel.ac.in/courses/111/107/111107106/**
5. **https://www.youtube.com/watch?v=QugqSa3Gl-w**

Pedagogy:

Power point presentation, Group Discussion, Seminar, Quiz, Assignment.

Second Allied Course III (AC)

Internet of Things

2021-2022 Onwards

Semester – IV	**Internet of Things**	**Hours/Week – 4**	
Second Allied Course - III		**Credits – 3**	
Course Code – 21UMA4AC4		**Internal**	**External**
		25	**75**

Objectives

- To study fundamental concepts of IoT
- To understand roles of sensors and learn different protocols used for IoT
- To apply the concept of Internet of Things in the real-world scenario

Course Outcome

CO No.	**CO Statement**	**Knowledge Level**
CO1	Understand building blocks of Internet of Things and characteristics	K2
CO2	Analyze basic protocols in wireless sensor network	K4
CO3	Illustrate different sensor technologies for sensing real world entities and identify the applications	K3
CO4	Demonstrate the ability to transmit data wirelessly between different devices	K3
CO5	Design IoT applications in different domain and be able to analyze their performance	K5

Mapping with Programme Outcomes

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	S	M	S	S	S
CO2	S	S	S	S	M
CO3	S	S	S	S	S
CO4	S	S	S	M	S
CO5	S	S	S	S	S

S-Strong, M-Medium, L-Low

Second Allied Course III

Internet of Things

2021-2022 Onwards

Syllabus

Unit I :

Introduction to Internet of Things:

Introduction – Overview of Internet of Things (IoT) - Characteristics of IoT - IOT Applications, Working and Implementation of IoT - Components of an IoT System - IoT Architecture and Levels - IoT Ecosystem - Value chain and global value chain - Types of Networks – IoT Technologies and Protocols – Technologies used in IoT.

Unit II :

Communication Protocols – IOT Enabling Technologies – Building blocks of IoT – The logical and Physical design of IoT – Functional blocks of IoT – IoT design Methodology – Communication models – Development tools used in IoT – SDN and NFV for IoT

Unit III :

Things and Connections:

Introduction to control systems – Working of controlled systems – Feedback systems – Connectivity models – OSI Model – TCP/IP model – Types of modes – Wired and Wireless Methodology – Transmission media – Guided media – Unguided media – The process flow of IoT.

Unit IV :

Sensors, Actuators and Microcontrollers:

Introduction – Sensor – Classification of Sensors – Types of Sensors – Criteria to choose a Sensor – Actuators – Classification of Actuators – Microcontroller – Classification of Microcontrollers – Components of Microcontroller – Types of Microcontrollers – Application of Microcontroller – Embedded System – Real time Embedded system – Microprocessor – Evolution of Microprocessor – Major parts of Microprocessor – Characteristics of Microprocessor – Classification of Microprocessors – CISC – RISC – EPIC – Architecture of Microprocessor – Microprocessor vs Microcontroller.

Unit V:

Building IoT Applications :

Introduction to Arduino – Types of Arduino Boards – Introduction to Arduino IDE – Parts of Arduino IDE – Development Cycle – Writing/Editing Code in Sketch – Compling –

Debugging – Uploading and Running a File – Role of Serial Monitor – Role of Serial Plotter – LED Programming – Open Your First Sketch.

Text Books:

S.NO.	AUTHORS	TITLE	PUBLISHERS
1	Prof. Satish Jain & Shashi Singh	IoT and its Applications	BPB Publications

Chapters and Sections:

UNIT	CHAPTER	SECTIONS
I	1	1.1 – 1.12
I	1	1.13 – 1.21
II	2	2.1 – 2.12
III	3	3.1 – 3.24
IV	4	4.1 – 4.12

Reference Book:

S.NO.	AUTHORS	TITLE	PUBLISHERS	YEAR OF PUBLICATION
1	Arshdeep Bahga and Vijay Madisetti	Internet of Things A Hands-on Approach	Universities Press	2014
2	Raj Kamal	Internet of Things Architecture and Design Principles	Mc Graw Hill Education (India) Private Limited	2017
3	Preston Gralla	How the Internet Works	Pearson Education	2012

Web links

1. **https://iotbyhvm.ooo/physical-design-of-iot/**
2. **https://www.javatpoint.com/iot-internet-of-things**
3. **https://www.oracle.com/in/internet-of-things/what-is-iot/**
4. **https://www.edureka.co/blog/iot-applications/**
5. **https://www.rfpage.com/applications-of-internet-of-things-iot/**

Pedagogy

Power point presentation, Seminar and Quiz

SKILL BASED ELECTIVE – I (A)

INTRODUCTION TO R

2021-2022 Onwards

Semester – IV	INTRODUCTION TO R	Hours/Week – 2	
Skill Based Elective –I(A)		Credits – 2	
Course Code – 21UMA4SBE1A		Internal 25	External 75

Objectives:

- To explore and understand how to use the R documentation.
- To master the use of the R and R Studio interactive environment.
- To understand how to create and manipulate data's in R.

Course Outcomes:

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Navigate in the R Studio interface.	**K2**
CO2	Explain concepts of matrices and arrays.	**K3**
CO3	Discuss about List and data frames.	**K3**
CO4	Apply R effectively to analyze and visualize data.	**K3**
CO5	Classify various testing of hypothesis.	**K2**

Mapping with Programme Outcomes:

COS/POS	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	S
CO2	S	M	S	S	M
CO3	S	S	S	S	S
CO4	S	M	S	S	M
CO5	S	S	S	S	S

S-Strong, M-Medium, L-Low

SKILL BASED ELECTIVE – I (A)

INTRODUCTION TO R

SYLLABUS

UNIT I **(6 Hours)**

Getting Started:

Obtaining and Installing R from CRAN – Opening R for the First Time – Saving Work and Exiting R – Conventions.

Numerics, Arithmetic, Assignment and Vectors:

R for Basic Math – Assigning Objects – Vectors.

UNIT II **(6 Hours)**

Matrices and Arrays:

Defining a Matrix – Subsetting – Matrix Operations and Algebra – Multidimensional Arrays.

Non-Numeric Values:

Logical Values – Characters.

UNIT III **(6 Hours)**

Lists and Data Frames:

Lists of Objects – Data Frames.

Special Values, Classes and Coercion:

Some Special Values – Understanding Types, Classes and Coercion.

UNIT IV **(6 Hours)**

Elementary Statistics:

Describing Raw Data – Summary Statistics.

Basic Data Visualization:

Barplots and Pie Charts – Histograms – Box-and-Whisker Plots – Scatter Plots.

UNIT V **(6 Hours)**

Common Probability distributions:

Common Probability Mass Functions – Common Probability Density Functions.

Hypothesis Testing:

Components of a Hypothesis Test – Testing Means – Testing Proportions – Testing Categorical Variables – Errors and Power.

TEXT BOOKS:

S.No	Authors Name	Title of the Book	Publishers Name	Year of Publication
1.	Tilman M. Davies	The Book of R A First Course in Programming and Statistics	No Starch Press Inc.,	2016

CHAPTERS AND SECTIONS:

UNIT	CHAPTER	SECTIONS
I	1	1.1 -1.4
	2	2.1 -2.3
II	3	3.1 - 3.4
	4	4.1 - 4.2
III	5	5.1 & 5.2
	6	6.1 & 6.2
IV	13	13.1 & 13.2
	14	14.1 – 14.4
V	16	16.1 & 16.2
	18	18.1 – 18.5

REFERENCE BOOKS:

S.No	Authors Name	Title of the Book	Publishers Name	Year ofPublication
1	Dr. Mark Gardener	Beginning R The Statistical Programming Language	John Wiley & Sons, Inc	2012
2	Joseph Schmuller	Statistical Analysis R for Dummies	John Wiley & Sons, Inc	2017
3	Andy Field Jeremy miles Zoe Field	Discovering Statistics Using R	Sage Publications Ltd	2012

Web links:

1. **https://youtu.be/V8eKsto3Ug**
2. **https://youtu.be/RwDV802ckU8**
3. **https://youtu.be/fDRa82lxzaU**
4. **https://youtu.be/lL0s1coNtRk**
5. **https://youtu.be/SJpd7KC18fQ?list=PLJ5C6qdAvBFfF7qtFi8PvRK8x55jsUQ**

Pedagogy:

Power point presentations, Group Discussions, Seminar, Quiz, Assignment.

SKILL BASED ELECTIVE- I (B)

INTRODUCTION TO STATISTICAL TOOLS AND TECHNIQUES - SPSS

2021-2022 Onwards

Semester – IV	**INTRODUCTION TO STATISTICAL TOOLS AND TECHNIQUES - SPSS**	**Hours/Week – 2**	
Skill Based Elective- I (B)		**Credits – 2**	
Course Code – 21UMA4SBE1B		**Internal 25**	**External 75**

Objectives:

- To learn basic data analysis and interpretation with SPSS.
- To manipulate and transform variables in SPSS.
- To establish a sound knowledge on SPSS.

Course Outcome:

On the Successful completion of the course the student would be able to

CO Number	CO Statement	Knowledge Level
CO1	Explain the objectives of SPSS.	**K2**
CO2	Apply SPSS for data interpretation.	**K3**
CO3	Compute various test using SPSS.	**K3**
CO4	Interpretation of several graphs in SPSS.	**K2**
CO5	Classify Data View, Variable View and Output View Screens.	**K2**

Mapping With Programme Outcomes:

COS/POS	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	S
CO2	S	S	S	S	S
CO3	S	S	M	S	M
CO4	S	M	S	S	S
CO5	S	S	M	S	M

S – Strong , M – Medium, L– Low

SKILL BASED ELECTIVE- I (B)
INTRODUCTION TO STATISTICAL TOOLS AND TECHNIQUES - SPSS
SYLLABUS

UNIT I **(6 hours)**

First Encounters:

Introduction and objectives- Entering, Analyzing and Graphing Data

Navigating in SPSS:

SPSS variable View screen-SPSS data view screen-SPSS Main menu- Data Editor Toolbar – Short tour of variable View screen.

UNIT II **(6 hours)**

Getting Data In and Out of SPSS:

typing data using the computer keyboard- Saving your SPSS Data and Output files- Opening your saved SPSS files – opening SPSS sample files- Copying and pasting data to other applications-Importing files from other applications- Exporting SPSS files to other applications.

Levels of Measurement:

Variable view screen**:** Measure column -Variables measured at the Nominal level- Variables measured at the Ordinal level- Variables measured at the Scale level.

UNIT III **(6 hours)**

Entering Variables and Data and Validating Data:

Entering Variables and assigning attributes (Properties)-Entering Data for each variable – Validating Data.

Working with Data and Variables:

Computing a new variable - Recoding Scale Data into a String Variable- Inserting new variables and Cases in to Existing Databases- Data View page: Copy, Cut and Paste procedures.

UNIT IV **(6 hours)**

Using the SPSS Help Menu:

Help Options – Using Help Topics – Using Help Tutorial – Using Help Case Studies – Getting Help When Using Analyze on the Main Menu.

Creating Basic Graphs and Charts:

Using Legacy Dialogs to Create a Histogram – Using Chart Builder to Create a Histogram – Using Legacy Dialogs to Create a Bar Graph – Using Chart Builder to Create a Bar Graph - Using Legacy Dialogs to Create a line Graph - Using Chart Builder to Create a line Graph - Using Legacy Dialogs to Create a Pie Chart - Using Chart Builder to Create a Pie Chart.

UNIT V **(6 hours)**

Editing and Embellishing Graphs:

Creating a Basic Graph – Editing a Basic Graph – Editing a Three-Dimensional Graph – Exporting Graphs to Documents.

Printing Data View, Variable View and Output Viewers Screens:

Printing Data From the Variable View Screen – Printing Variable Information From and Output Viewer – Printing Tables From and Output Viewer.

TEXT BOOKS:

S. No.	Authors Name	Title of the Book	Publishers Name	Year of Publication
1.	James B. Cunningham & James O. Aldrich	An Interactive Hands-on Approach	SAGE Publications India Pvt Ltd, New Delhi	2012

CHAPTERS AND SECTIONS:

UNIT	CHAPTERS	SECTIONS
I	1 & 2	1.1-1.2, 2.1-2.6
II	3 & 4	3.1-3.8, 4.1-4.5
III	5 & 6	5.1-5.4, 6.1-6.5
IV	7 & 8	7.1- 7.6, 8.1-8.9
V	9 & 10	9.1-9.5 10.1-10.4

REFERENCE BOOKS:

S. No.	Authors Name	Title of the Book	Publishers Name	Year of Publication
1.	Keith McCormick & Jesus Salcedo with Aaron Poh	SPSS Statistics for Dummies	Wiley India Pvt Ltd, New Delhi, 3rd Edition.	2015
2.	Robert H. Carver &Jane Gradwohl Nash	Doing Data Analysis	Thompson Brooks/Cole	2013
3.	Dr. S .L. Gupta & Hitesh Gupta	SPSS17.0 for Researchers	International Book House Pvt. Ltd- 2nd Edition.	2014

Web links:

1. **https://youtu.be/Bku1p481z80**
2. **https://www.youtube.com/watch?v=_zFBUfZEBWQ**
3. **https://youtu.be/DmS63ivVjis**
4. **https://youtu.be/i8lmUkB4lag**

Pedagogy:

Power point presentation, Group Discussion, Seminar, Assignment.

NON-MAJOR ELECTIVE (NME)– II

MATHEMATICS FOR COMPETITIVE EXAMINATIONS - II

2019-2020 Onwards

Semester - IV	**MATHEMATICS FOR COMPETITIVE EXAMINATIONS - II**	**Hours/Week – 2**	
Non-Major Elective-II		**Credits – 2**	
Course Code – 19UMA4NME2		**Internal 25**	**External 75**

Objectives:

- To provide the knowledge to analyze, interpret and solve the Mathematical problems.
- To develop the thinking capacity to solve the problems.
- To study many short tricks to solve the mathematical problems easily

Course Outcomes:

On the successful completion of the course, students will be able to

CO Number	**CO Statement**	**Knowledge Level**
CO1	Solve decimal fractions and simplification.	**K2**
CO2	Explain the concept of square roots, cube roots, Average, profit .and loss	**K2**
CO3	Apply the concept of Ratio & Proportion and Problems on Trains.	**K3**
CO4	Distinguish the concept of Simple Interest and Compound Interest.	**K3**
CO5	Apply the concept of Permutations &Combinations, Odd Man Out & Series.	**K3**

Mapping with Programme Outcomes:

COs/POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	S	M	S	S	S
CO2	M	S	S	S	S
CO3	S	S	M	M	S
CO4	S	S	M	M	M
CO5	S	S	S	S	M

S - Strong, M - Medium, L - Low

NON-MAJOR ELECTIVE – II (NME)

MATHEMATICS FOR COMPETITIVE EXAMINATIONS - II

SYLLABUS

UNIT I **(6 Hours)**

Decimal Fractions – Simplification

UNIT II **(6 Hours)**

Square Roots & Cube Roots - Average - Profit & Loss

UNIT III **(6 Hours)**

Ratio & Proportion - Problems on Trains

UNIT IV **(6 Hours)**

Simple Interest - Compound Interest

UNIT V **(6 Hours)**

Permutations & Combinations – Odd Man Out & Series

TEXT BOOKS:

S. No.	Authors Name	Title of the Book	Publishers Name	Year of Publication
1.	R.S.Aggarwal	Quantitative Aptitude	S. Chand & Company Ltd,	2007

CHAPTERS AND SECTIONS:

Unit	Chapter	Pages
I	3 & 4	46 – 116
II	5, 6 & 11	117 - 160 and 251 - 293
III	12 & 18	294 – 310 and 405 - 424
IV	21 & 22	445 – 486
V	30 & 35	613 – 620 and 649 - 657

REFERENCE BOOKS:

S. No.	Authors Name	Title of the Book	Publishers Name	Year of Publication
1.	T.K.Sinha	80+ Practice Sets of Quantitative Aptitude for Bank PO Exams	Arihant Publication (India) limited	2002
2.	Abhijit Guha	Quantitative Aptitude for Competitive Examinations	McGraw-Hill Publishing Company Limited, New Delhi, 5th Edition	2014

Web links:

1. **https://youtu.be/8BeJUzLqOTE**
2. **https://youtu.be/pShzc9AQMos**
3. **https://youtu.be/JP5J-rzoATg**
4. **https://youtu.be/ZnpEoROH1Vc**
5. **https://youtu.be/VIsyYMEAagc**

Pedagogy:

Group Discussion, Seminar, Assignment.